

APP 2A AMEND

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CLAIMS

- 1 1. An apparatus including thermal stress reduction, comprising:
2 a package;
3 a mass coupled to the package, the mass having a surface, the mass further
4 including an active region; and
5 one or more substantially rigid members for attaching at least one point on the
6 surface to the package to create a resilient coupling between the mass and the
7 package, wherein at least a portion of the active region is spaced apart from
8 the at least one point of attachment.
- 1 2. The apparatus of claim 1, wherein the package comprises; a package including
2 a cavity for receiving the mass.
- 1 3. The apparatus of claim 1, wherein the package comprises:
2 a package including a recess for receiving the rigid member.
- 1 4. The apparatus of claim 1, wherein the mass comprises one or more bond pads for
2 coupling the mass to the package.
- 1 5. The apparatus of claim 4, wherein the bond pads have a cross-sectional shape
2 selected from the group consisting of approximately rectangular, approximately oval,
3 approximately tri-oval, approximately oct-oval, approximately wavy sided rectangular,
4 approximately oct-pie-wedge, approximately hollow oct-pie-wedge, approximately nine-
5 circular, approximately starburst, or approximately sunburst.
- 1 6. The apparatus of claim 4, wherein the mass comprises one or more passive
2 regions; and
3 wherein the bond pads are approximately located in the passive regions.

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- 1 7. The apparatus of claim 4, wherein the mass further comprises a first passive
2 region; and
3 wherein the bond pads are approximately located in the first passive region.
- 1 8. The apparatus of claim 7, wherein the first passive region is located at one end of
2 the mass.
- 1 9. The apparatus of claim 4, wherein the mass further comprises a first passive
2 region and a second passive region; and
3 wherein the bond pads are located in the first passive region and the second
4 passive region.
- 1 10. The apparatus of claim 9, wherein the first passive region is located at one end of
2 the mass; and
3 wherein the second passive region is located at the opposite end of the mass.
- 1 11. The apparatus of claim 4, wherein the mass further comprises a first passive
2 region integral to the active region; and
3 wherein the bond pads are located in the first passive region.
- 1 12. The apparatus of claim 11, wherein the first passive region is located at one end
2 of the mass; and
3 wherein the first active region is located at the opposite end of the mass.
- 1 13. The apparatus of claim 4, wherein the mass further comprises an active region;
2 and
3 wherein the bond pads are approximately located in the active region.
- 1 14. The apparatus of claim 13, wherein the bond pads are located in the approximate
2 center of the active region.

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1 15. The apparatus of claim 1, wherein the rigid members have a cross-sectional shape
 2 that is approximately rectangular or approximately circular.

1 16. The apparatus of claim 1, wherein the rigid members are approximately located
 2 at one end of the package.

1 17. The apparatus of claim 1, wherein the rigid members are approximately located
 2 at the approximate center of the package.

1 18. The apparatus of claim 1, wherein there are one or more first rigid members and
 2 one or more second rigid members;
 3 wherein the first rigid members are approximately located at one end of the
 4 package; and
 5 wherein the second rigid members are approximately located at the opposite end
 6 of the package.

1 19. The apparatus of claim 1, wherein the rigid members are a material selected from
 2 the group consisting of solder, conductive epoxy, non-conductive epoxy, and glass frit.

1 20. The apparatus of claim 1, further comprising one or more sliding supports coupled
 2 to the package for slidably supporting the mass.

1 21. The apparatus of claim 20, wherein the sliding supports have a cross-sectional
 2 shape selected from the group consisting of approximate square, approximate circle,
 3 approximate triangle and approximate rectangle.

1 22. The apparatus of claim 1, wherein the package comprises:
 2 a package including a pedestal for supporting the rigid members.

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1 23. The apparatus of claim 1, wherein the mass is a micro-machined device, an
2 integrated circuit chip, or an optical device.

1 24. The apparatus of claim 1, wherein the rigid members further electrically couple
2 the mass to the package.

1 25. A method of coupling a mass having an active region to a package to reduce
2 effects of thermal stress, comprising:
3 attaching at least one surface point on the mass to the package using one or more
4 substantially rigid members to create a resilient coupling between the mass and
5 the package, wherein at least a portion of the active region is spaced apart from
6 the at least one point of attachment.

1 26. The method of claim 25, wherein attaching the mass comprises attaching the mass
2 at a plurality of locations.

1 27. The method of claim 25, wherein the mass comprises a passive region, and
2 wherein attaching the mass comprises attaching the passive region to the package.

1 28. The method of claim 27, wherein the passive region is located at one end of the
2 mass.

1 29. The method of claim 25, wherein attaching the mass comprises attaching the
2 active region to the package.

1 30. The method of claim 29, wherein attaching the active region comprises attaching
2 the approximate center of the active region to the package.

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1 31. The method of claim 25, wherein the mass comprises a first passive region and
2 a second passive region; and
3 wherein attaching the mass comprises attaching the first passive region to the
4 package and attaching the second passive region to the package.

1 32. The method of claim 31, wherein the first passive region is located at one end of
2 the mass; and
3 wherein the second passive region is located at an opposite end of the mass.

1 33. The method of claim 25, wherein the mass further comprises a passive region
2 integral to the active region; and
3 wherein attaching the mass comprises attaching the passive region to the package.

1 34. The method of claim 33, wherein the passive region is at one end of the mass; and
2 wherein the active region is at the opposite end of the mass.

1 35. The method of claim 25, wherein attaching the mass comprises permitting the
2 mass to expand and contract without inducing stresses in the mass.

1 36. The method of claim 25, wherein attaching the mass comprises providing for
2 expansion and contraction of the package without inducing stresses in the mass.


1 37. The method of claim 25, further comprising slidably supporting the mass at one
2 or more different locations.

1 38. The method of claim 37, wherein slidably supporting the mass comprises
2 slidably supporting the mass at a plurality of locations.

1 39. The method of claim 37, wherein slidably supporting the mass comprises
2 providing for expansion and contraction without inducing stresses in the package.

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41. The method of claim 25, further comprising electrically coupling the mass to the package at one or more different locations.


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